

# Finding the right inspector

With the enormous consequences of missing one problem container – the can with a split flange or a soft drink container mistakenly filled with beer – machine vision inspection systems are virtually a necessity for all high-speed container manufacturing lines. Today's machine vision inspection systems are performing 100 per cent inspections at line speeds of up to 3,000 containers per minute and automatically rejecting defects from the line. Importantly, they can also detect many smaller and even "hidden" significant defects that no other method can.

However, investing in a machine vision inspection system is a decision that shouldn't be taken lightly. It has a direct impact on your product's quality and your company's reputation. The first step to finding the right system for your operation is to know what to look for.

## Key operation

The single biggest key to selecting the right system is to first select the right supplier. Container manufacturers benefit substantially when they choose a machine vision vendor that has designed their inspection equipment for extreme accuracy and the highest reliability in specific applications like inside can inspection, shell, converted end and mixed label inspection. Particularly valuable capabilities of these systems are inspection for flange integrity (for proper and secure seal), can body inspection (for damage and contaminants) and mixed labels (ie, rogue cans).

## Experience

It is critical that your inspection system supplier has not only a wealth of experience in vision technology but also in your manufacturing processes. In understanding these manufacturing processes, the supplier should be able to develop the appropriate lighting and optics, software and user interface for the application.

Before entrusting your product's quality to a vision supplier, investigate how the company services its current customers. Talk to other manufacturers that have worked with the supplier. Are they satisfied with the equipment and support? Does the supplier deliver on its promises?

Also, know the right questions to ask of your sales representative. Ask about experience and history in the container manufacturing industry. Verify they know the processes a can manufacturer goes through from press all the way to palletiser and can demonstrate an understanding of the type of inspection you need.

It is critical you choose an experienced vision supplier that can optimise your product quality while minimising maintenance and false spoilage. If the system requires a lot of oversight and maintenance, or increases wastage unnecessarily through false rejects, it may do more harm than good to the bottom line.

## Technology

The technology behind machine vision inspection is continually getting faster, smarter and less costly. Basically, machine vision inspection consists of lighting, optics, video cameras, and computer software and hardware, including user interface. All of which, like electronics everywhere, are benefiting from faster processors, more sophisticated software and hardware components that are less expensive to make yet markedly more robust, durable and reliable. Not only do today's application-specific solutions perform their tasks far better than machine vision ever has, they are costing less to own — and saving their owners more.

Here are the key qualities of inspection technology you should investigate.

## Application-specific

Any task simply goes better when you use the tool that was designed for the particular job. For reliable 100 per cent inspection of your unique areas of interest, at your line speeds, in your plant configurations and to best serve your processes, the most effective machine vision is application-specific.

A vision partner that understands your process, its needs and limitations will be able to design a system that saves you the most and, in the long run, cost you the least. They will be able to design a system with custom capabilities such as providing key process feedback to plant personnel that correlates specific defects with the appropriate body maker and/or necker pocket. Working with proven industry expertise also brings the ability to inspect for fine, obscured or particular defects. "Systems" merely put together with general-industry components and without application-specific engineering lack effectiveness and reliability, often wasting the initial investment and consuming further operational time and expense.

## Hardware

The optimal current system hardware includes dual-processing CPUs that allow multiple cameras to be run from one processor, reducing the cost per camera. Digital gigabyte Ethernet cameras (more immune to interruptive "noise") can be positioned much farther away from the CPU, thus increasing the number of lines that can be inspected with one CPU. Also consider highly efficient, better-performing hardware technologies such as LED lighting and higher frame-rate camera capabilities.



*The system's user interface should translate all the sophistication of the machine vision process into the easy-to-understand, ready-to-use information an operator needs to ensure the highest possible product quality*

**Finding the right visual inspection system is key to can making operations, notes Amir Novini of Applied Vision Corporation**



Your vision supplier must understand your manufacturing processes in order to develop the appropriate lighting and optics, software, and user interface for your application

When evaluating a supplier's hardware options, make sure they use off-the-shelf electronic hardware wherever possible to ease any needed repairs and take advantage of economies of scale. At the same time, the supplier should be able to design and implement specific hardware solutions if nothing is commercially available to meet your needs. For example, your vision supplier may need to design specific hardware to track parts at high speeds as this may not be readily available in the market place.

### Software

Algorithms are the brains behind machine vision's genius. For example, they determine if a flaw can be found, and if so, to what level of confidence and repeat-

ability. Expertly developed algorithms are the key to finding smaller and finer defects, more clearly distinguishing among types of defects and doing all of it accurately at today's increasingly higher line speeds. Choosing a supplier that has developed algorithms specifically geared toward your application will help minimise or eliminate false rejects or accepts. In certain applications such as mixed label or the detection of rogue cans, it may be beneficial to utilise self-learning algorithms. Ask the vendor if they have this capability and to what extent.

### Lighting and optics

A vision system's lighting and optics are just as important as the algorithms. Properly configured lighting and optics provide even illumination. The right illumination will normalise process variation but still magnify defective areas. Make sure the supplier can develop or provide specific lighting and optics solutions to fit your application, including specialised lenses, beam splitters and expert assembly.

Other keys to look for are lighting and optics that are manufactured by the vision supplier. Also ask what testing is done on the systems before shipment and review documentation of the testing results.

### User interface

A machine vision inspection system must be as quick, simple and as mistake-proof as possible to use. The leading ones feature colourful graphic touch-screen controls that let an operator key-in inspection parameters in five minutes or less, make sensitivity changes on the fly, plus have the system check the acceptability of the proposed changes, minimising uncertainty and risk. The system should facilitate all of this without interrupting the current

inspection process.

Involve the people that operate the system on a daily basis in a review of the user interface. Does it use complicated terminology that might confuse an operator? Does it require knowledge of programming to use the system to its full potential? The right user interface should translate all the sophistication of the machine vision process into the easy-to-understand, ready-to-use information an operator needs to ensure the highest possible product quality.

The user interface should also be developed to withstand the factory environment. Make sure the display and/or keyboard (if used) is industrially hardened.

### Process improvement

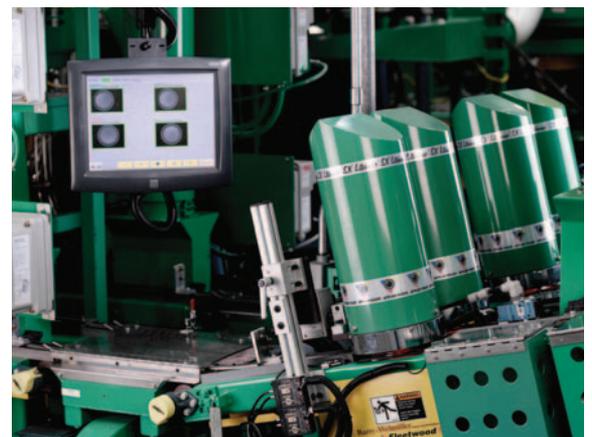
It is very important that the vision inspection system you choose requires no manual intervention or interruption to the manufacturing process. In fact, an in-line inspection system should do more than just integrate with the manufacturing process, it should enhance the process. Today's leading systems are monitoring, counting, reporting, signalling problems — and more.

To get the most value, go beyond conventional capabilities such as process feedback and statistical analysis. When inspection systems with this intelligent-machine software detect a defect trend, they are also able to recognise the exact upstream manufacturing component causing it and can immediately alert or page personnel, send notification to a specific device, display it on a marquee, and/or shut down the line, according to plant's requirements. For example, while inspecting shells, an inspection system should be able to provide you with key process data that informs you which liner gun is problematic. This information will save many hours of downtime due to maintenance.

### Continuous improvement

The machine vision industry has clearly been watching and, to a great extent, experiencing the challenges its customers face in adopting ever-higher quality standards and meeting unprecedented performance levels. And it knows that process is continuous.

Because technology moves so quickly, it is important to make sure your partner can keep you on top of the



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latest developments. Look for a company that is continually bringing new ideas to market. They can bring you the latest technology to keep you ahead of the industry.

**Pre-Sales Support**

To ensure a vision system is accurate and reliable in your application, work with the supplier on a feasibility analysis. This involves providing a sample of your inspection criteria and a sample of your product. Be sure your sample includes examples of normal process variation. By analyzing this sample, your supplier should be able to determine the level of defects it can detect without rejecting good product. The key is to differentiate between your normal process variation and what is a true defect. This feasibility analysis will determine whether the system can deliver the minimum defect sensitivity without producing a high false reject rate.

**Post-Sales Support**

A high quality, application-specific vision inspection system should be easy to use and require no on-site expertise. But no matter what system you choose, you will need the continual support of an expert partner for training, service calls and any required on-going maintenance. It is important to evaluate the service capabilities very closely. It is one of the key factors that will determine whether your system returns value for years to come or becomes a drain on your resources.

Choose a partner that offers global service and support. This will ensure that they can get to you quickly when on-site consultation is needed. Also ask about the availability of replacement parts and whether they offer customer support 24 hours a day.

Review the pricing structure for continual support. Look for a service arrangement that fits your needs as a manufacturer. For example, Applied Vision is now offering service contracts that provide both equipment and expertise for one monthly fee. The arrangement is designed to cover all of a manufacturer's vision inspection needs, including design and installation, training, ongoing maintenance and repair, continual monitoring of the equipment's operation and replacement parts. The arrangement also includes continuous updates to both hardware and software for the life of the contract, meaning the equipment never becomes obsolete or outdated.

**A partner you can trust**

More than a method or a device, machine vision inspection is technology that is becoming an integral part of the manufacturing process. Choosing the right vision equipment partner will not only ensure that you provide the highest possible quality for your customers, it will improve the overall manufacturing process and boost the bottom line. □

Amir Novini is president and CEO of Applied Vision Corporation. With more than 27 years of experience in the field of machine vision, he has developed three generations of machine vision systems. He has authored numerous papers on machine vision and has several patents. [www.appliedvision.com](http://www.appliedvision.com).



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